

Agilent Technologies

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# E1412A VXI Digital Multimeter Component Level Information

**Information in this packet applies to the following assemblies:**

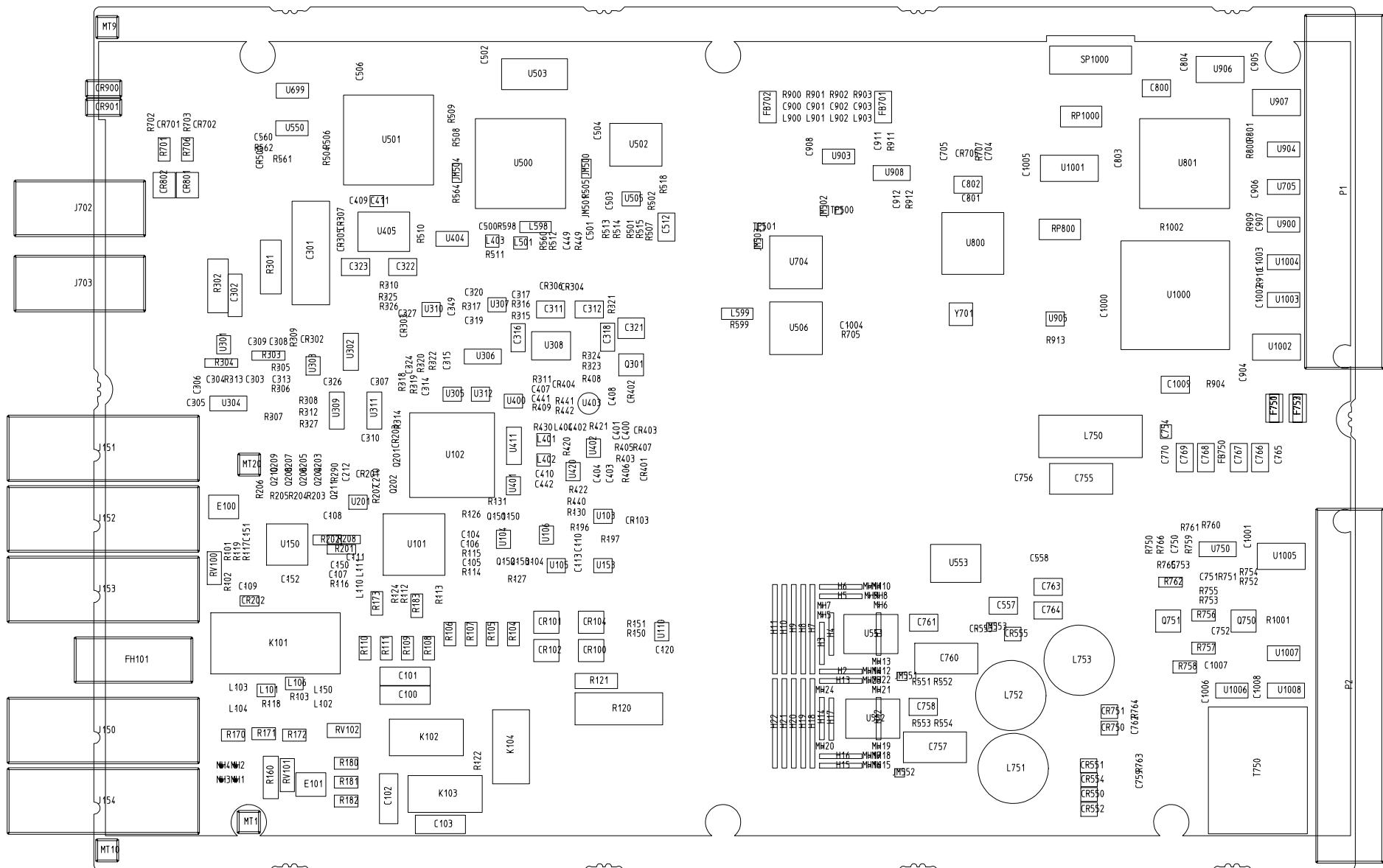
1. E1412-66501 PC Assembly
2. E1412-66511 PC Assembly (E1412A-J01)

**The following is included in this packet:**

1. Component locators
2. Schematics
3. Parts lists with Agilent and manufacturer's part numbers

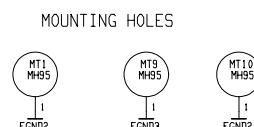
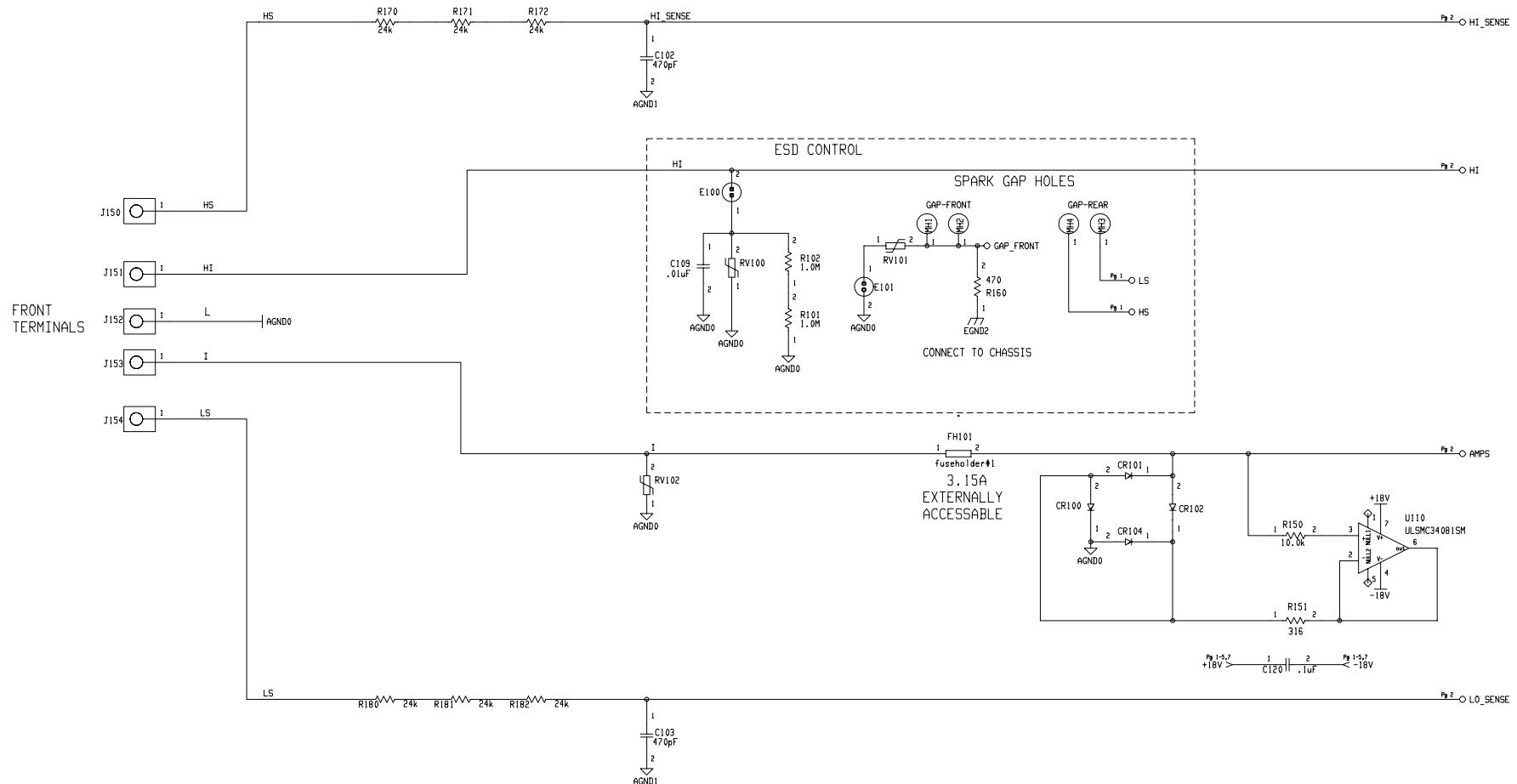


**Agilent Technologies**



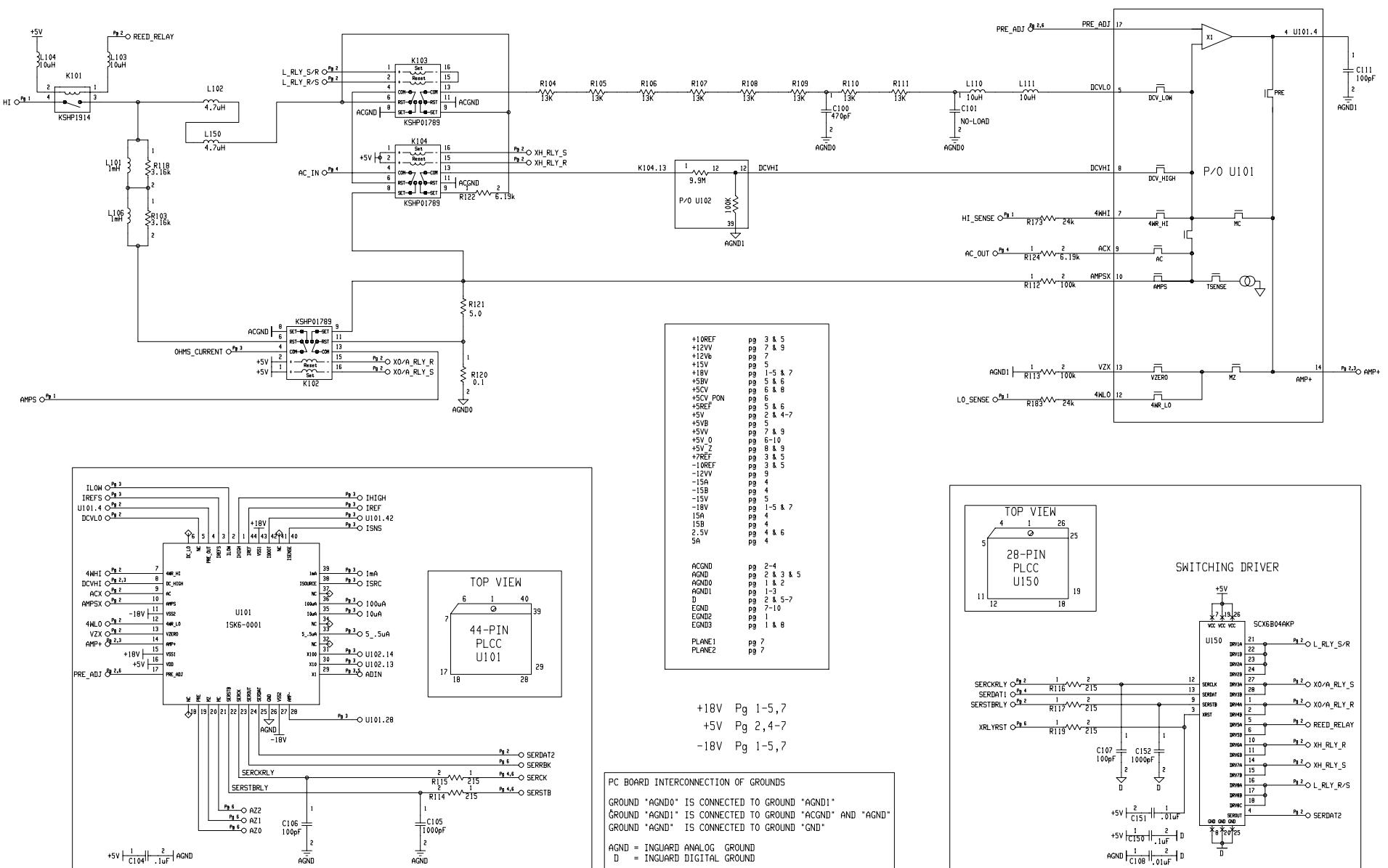
# Agilent E1412A VXI Digital Multimeter

## E1412-66501 Component Locator

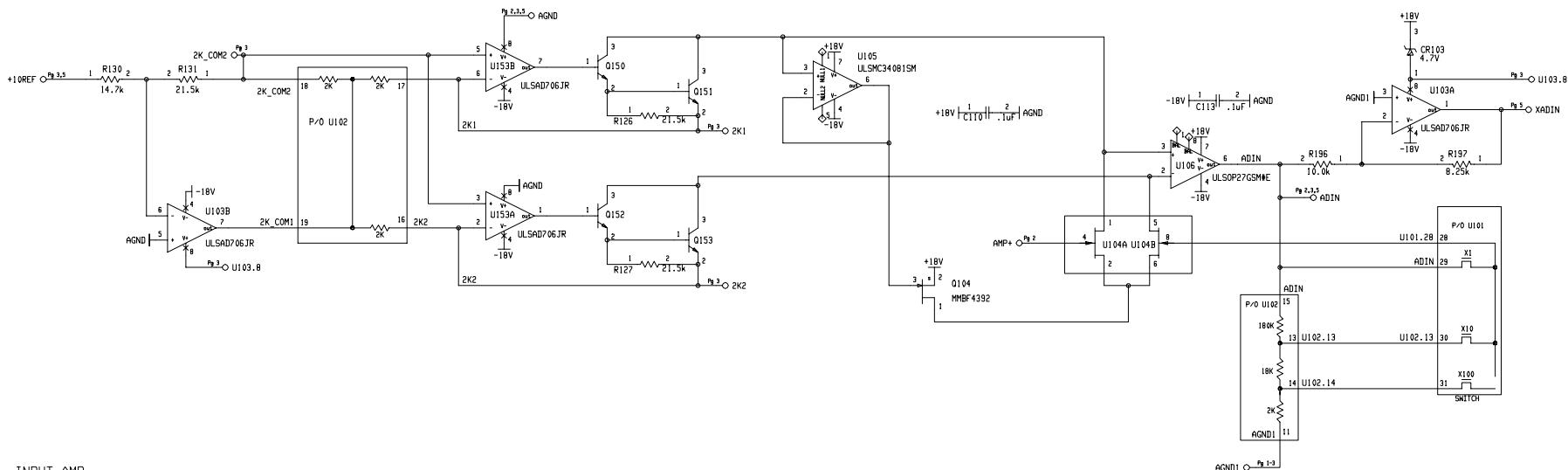


+10REF	pg 3	3 & 5
+12V	pg 7	& 9
+12Vb	pg 7	
+15V	pg 5	
+18V	pg 5	5 & 7
+5RV	pg 5	5 & 6
+5CV	pg 6	& 8
+5CV_PON	pg 6	
+5REF	pg 5	& 6
+5V	pg 2	& 4-7
+5VB	pg 5	
+5VV	pg 5	
+5V_V	pg 6	& 9
+5V_0	pg 6	6-10
+5V_Z	pg 8	& 9
+7REF	pg 3	5 & 7
-10REF	pg 3	3 & 5
-12V	pg 9	
-15A	pg 4	
-15B	pg 4	
-15V	pg 5	
-18V	pg 1	5 & 7
15A	pg 4	
15B	pg 4	
2.5V	pg 4	& 6
5A	pg 4	
AGND	pg 2	2-4
AGND	pg 2	2 & 3 &
AGND0	pg 1	1 & 2
AGND1	pg 1	3-5
D	pg 2	2 & 5-7
EGND	pg 7	1-10
EGND2	pg 1	
EGND3	pg 1	1 & 8
PLAN1	pg 1	
PLAN2	pg 7	

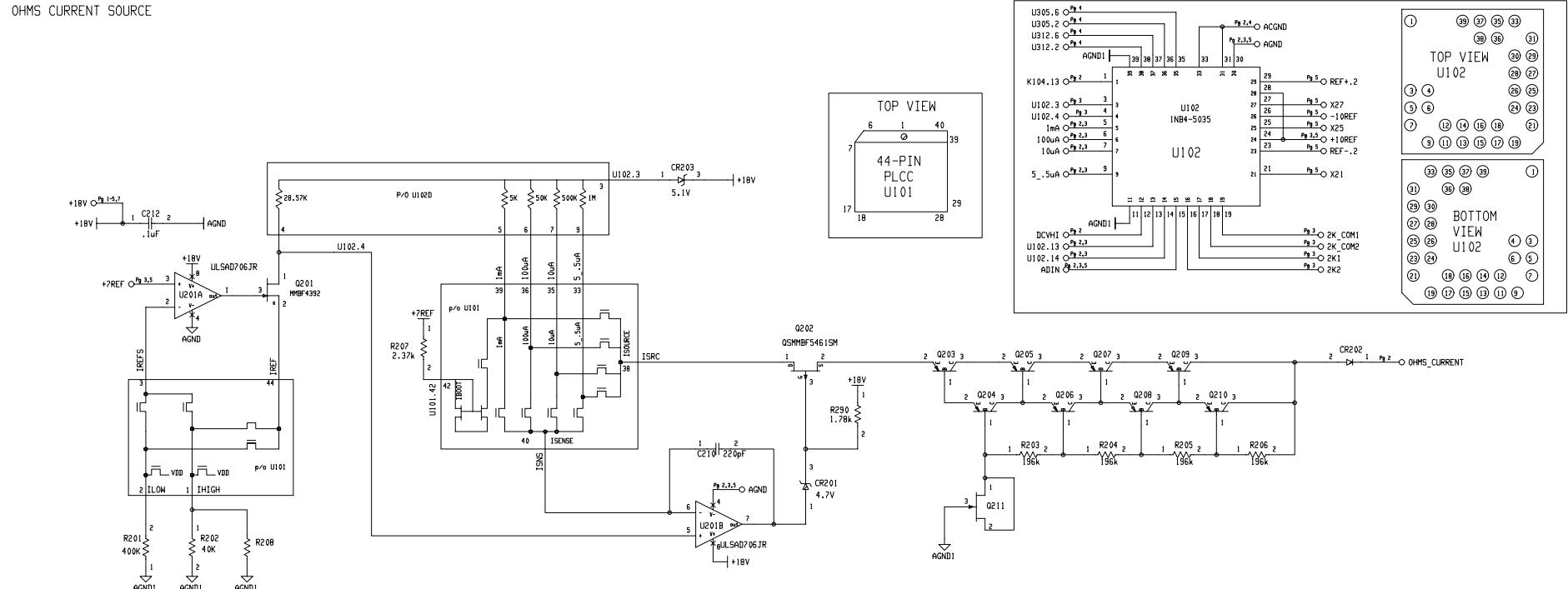
**Agilent E1412A  
VXI Digital Multimeter  
E1412-66501  
Input Protection**



**Agilent E1412A  
VXI Digital Multimeter  
E1412-66501  
Function Switching**



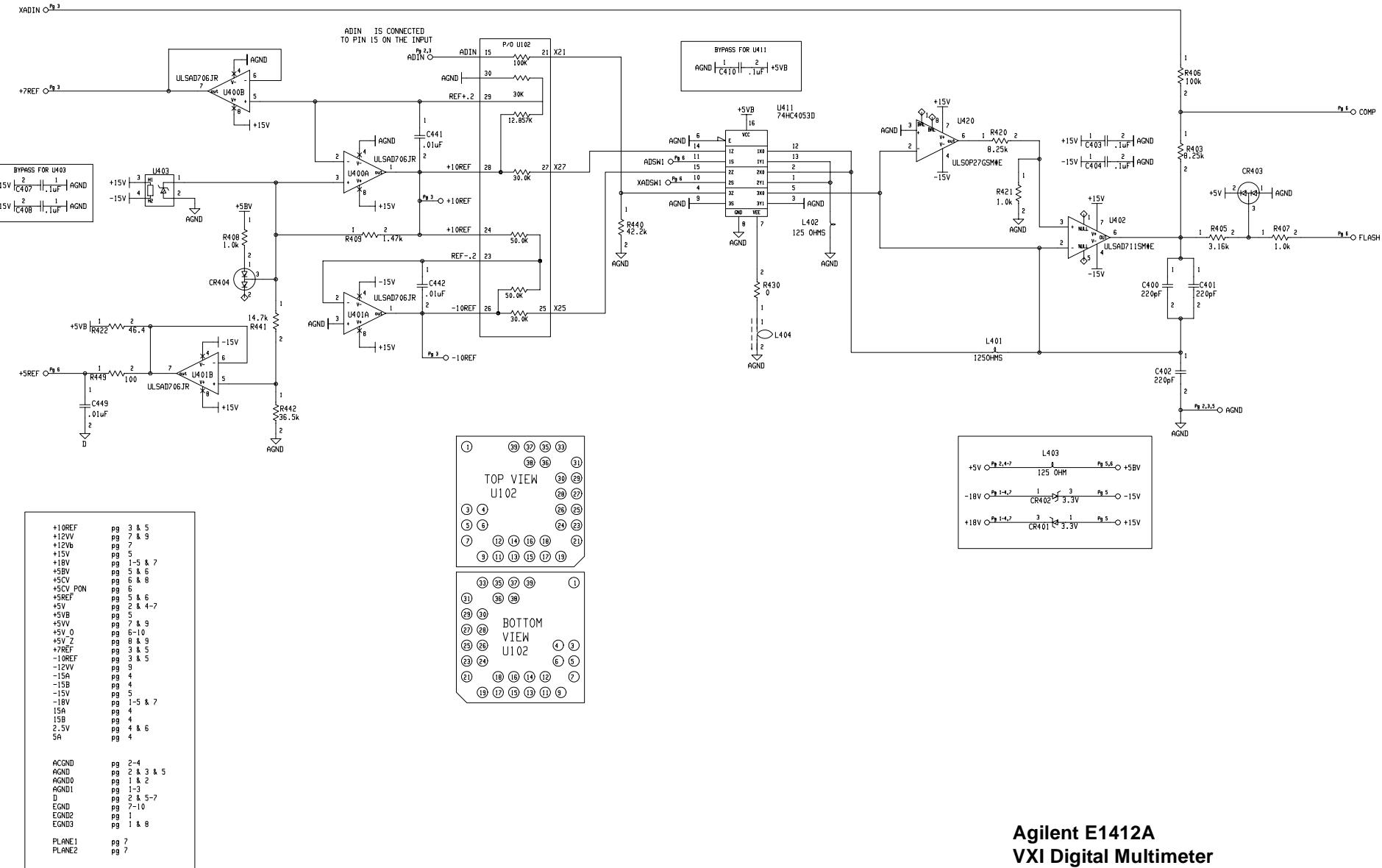
### INPUT AMP

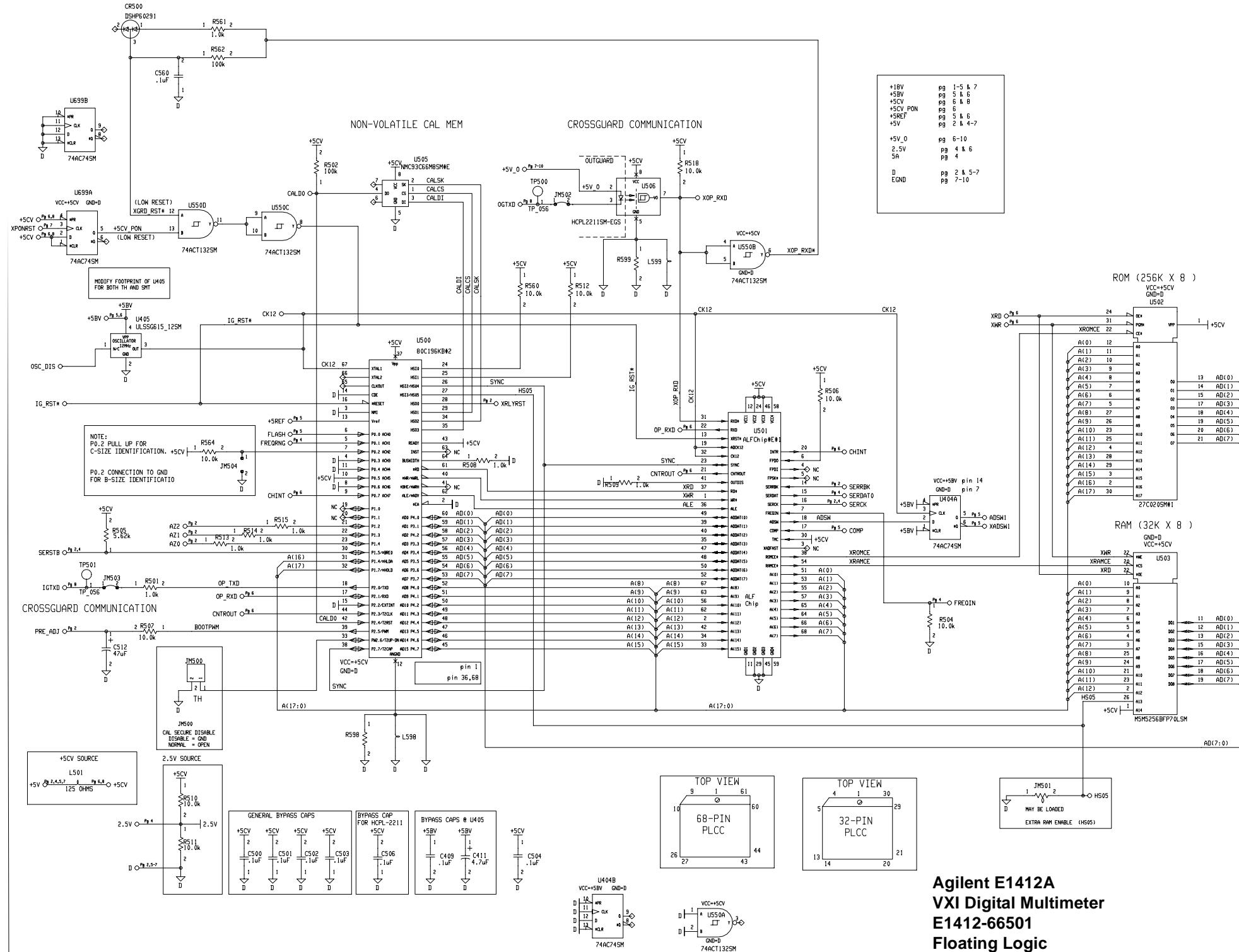


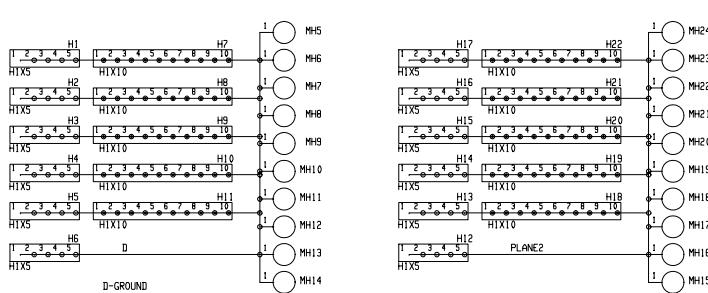
**Agilent E1412A  
VXI Digital Multimeter  
E1412-66501  
DC Amp & Ohms**



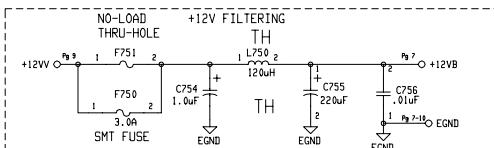
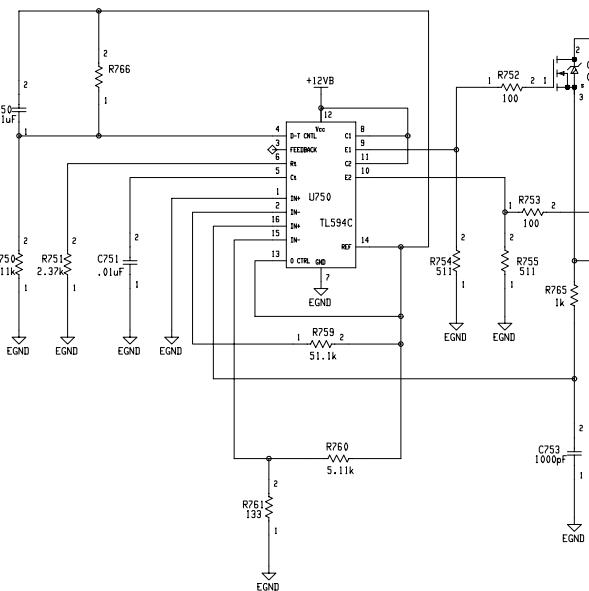
REFERENCES



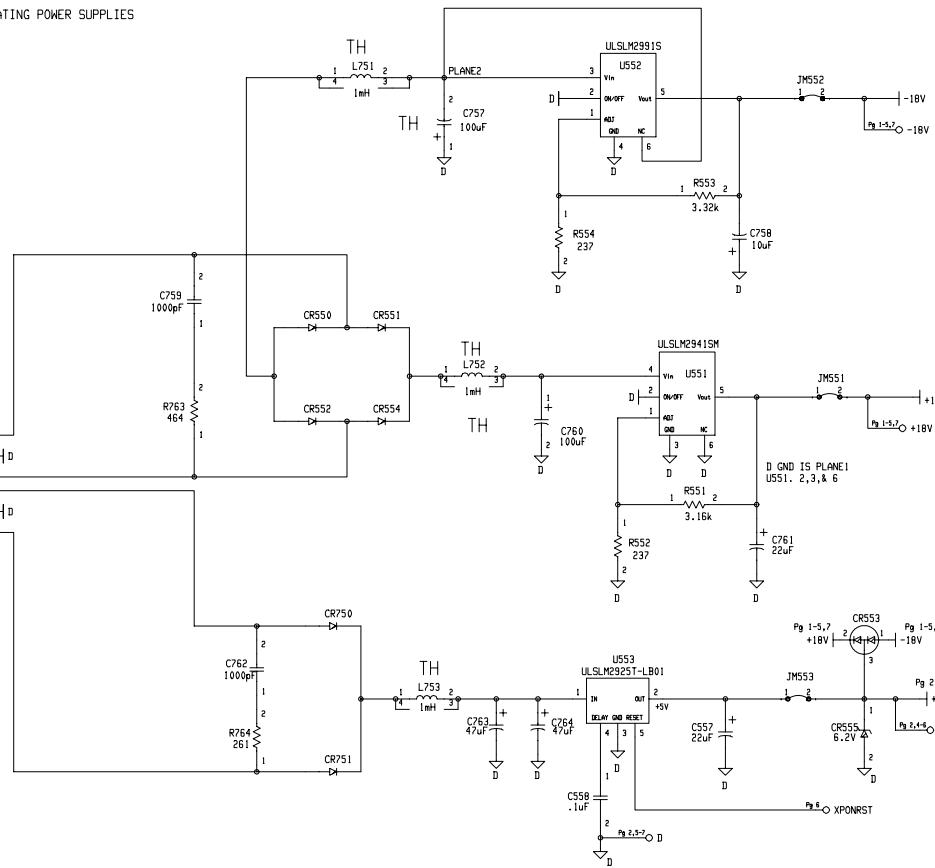




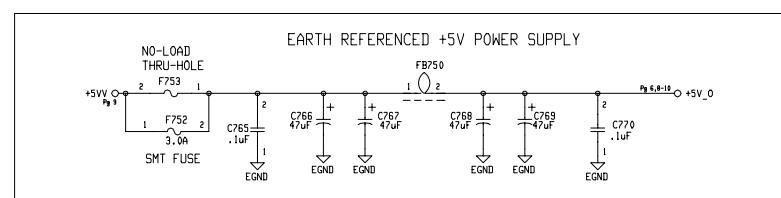
#### EARTH REFERENCED CIRCUITS



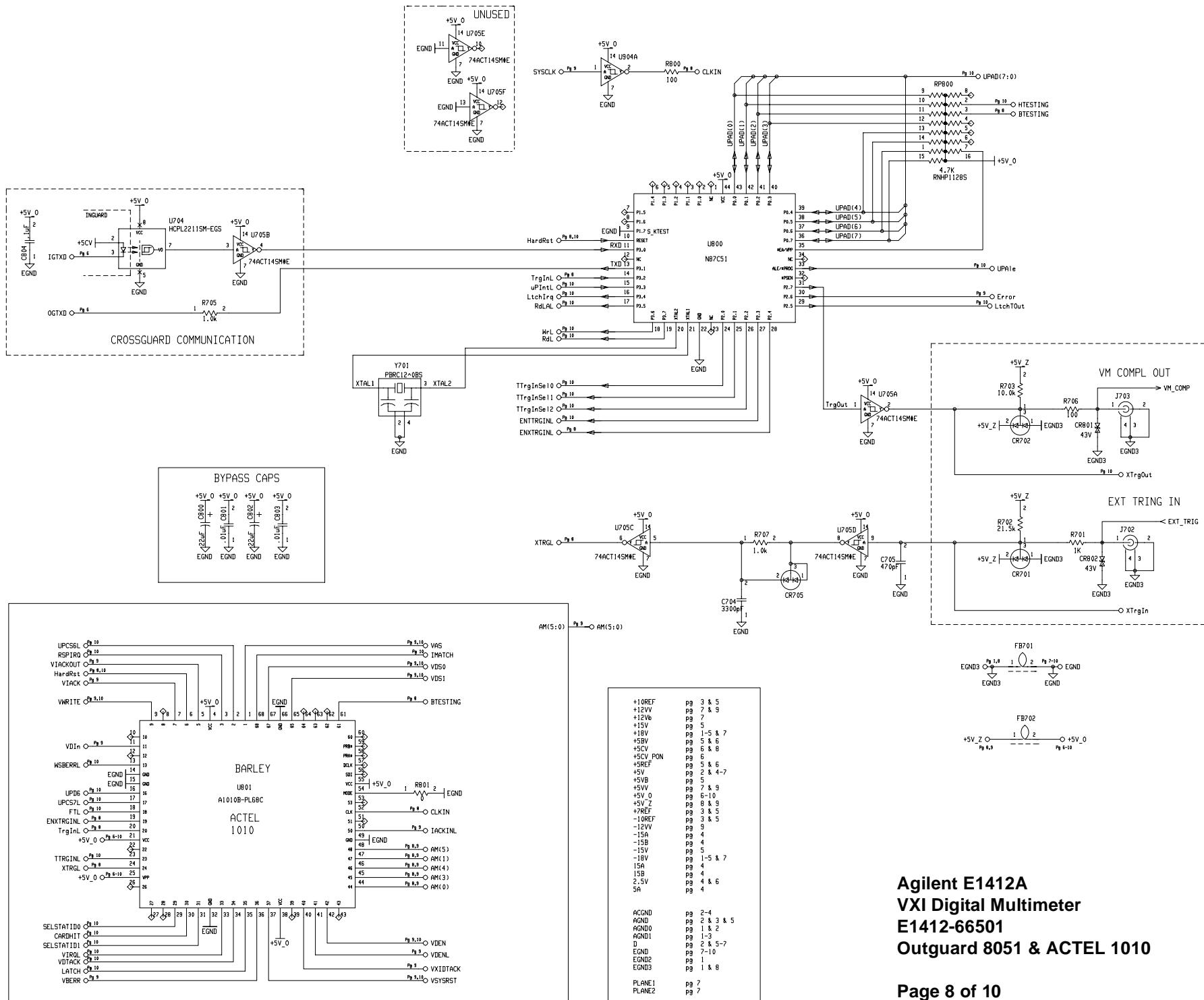
#### FLOATING POWER SUPPLIES



+10REF	Pg 3 & 5
+12V	Pg 7 & 9
+12Vb	Pg 7
+15V	Pg 5
+18V	Pg 5 & 7
+5V	Pg 5 & 6
+5VZ	Pg 6 & 8
+5VCP	Pg 6 & 8
+5VCPON	Pg 5 & 6
+5VREF	Pg 5
+5V	Pg 2 & 4-7
+5VB	Pg 5
+5VW	Pg 7 & 9
+5VZ	Pg 6-10
+5V0	Pg 8 & 9
+7REF	Pg 3 & 5
-10REF	Pg 3 & 5
-12V	Pg 9
-15A	Pg 4
-15B	Pg 4
-15V	Pg 4
-15V	Pg 5
-18V	Pg 1-5 & 7
15A	Pg 4
15B	Pg 4
2.5V	Pg 4 & 6
5A	Pg 4
AGND	Pg 2-4
AGND	Pg 2 & 3 & 5
AGND0	Pg 2 & 2
AGND1	Pg 1-3
D	Pg 2 & 5-7
EGND	Pg 7-10
EGND2	Pg 1
EGND3	Pg 1 & 8
PLANE1	Pg 7
PLANE2	Pg 7

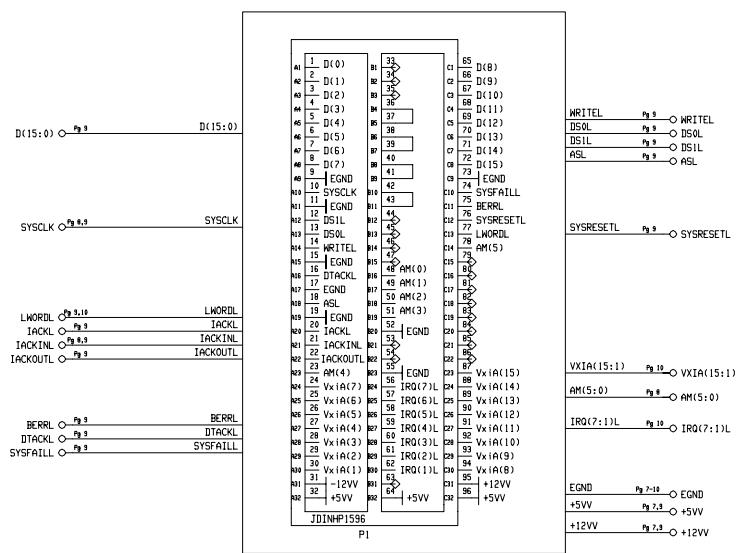


**Agilent E1412A  
VXI Digital Multimeter  
E1412-66501  
Power Supplies**

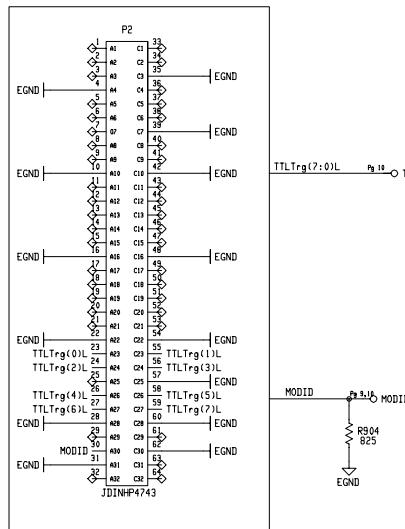


**Agilent E1412A  
VXI Digital Multimeter  
E1412-66501  
Outguard 8051 & ACTEL 1010**

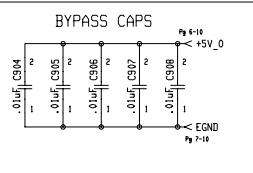
VXI P1



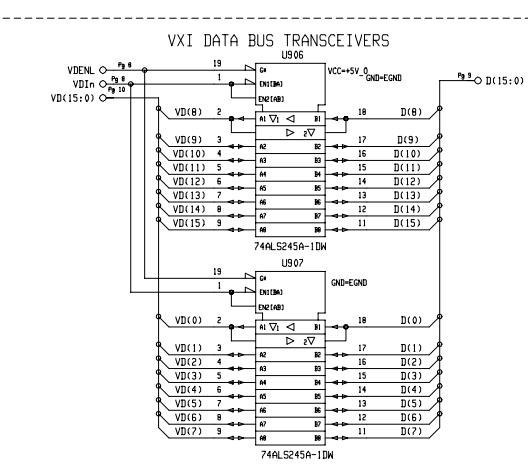
VXI P2



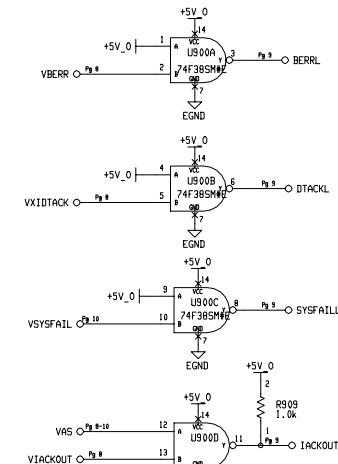
+12VW pg 7 & 9  
+5VW pg 7 & 9  
+5VZ pg 6-10  
+5VZ pg 8 & 9  
-12VW pg 9  
EGND pg 7-10



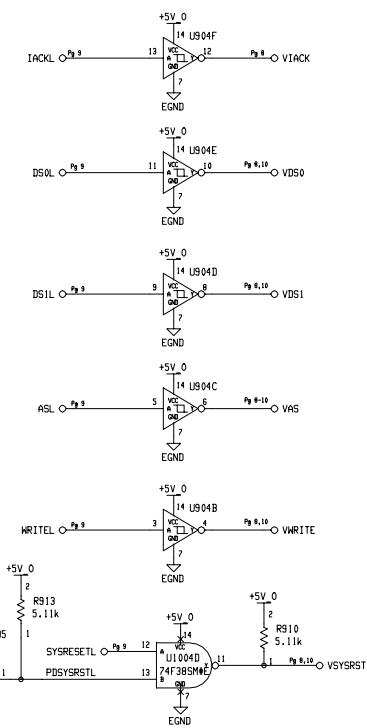
VXI DATA BUS TRANSCEIVERS



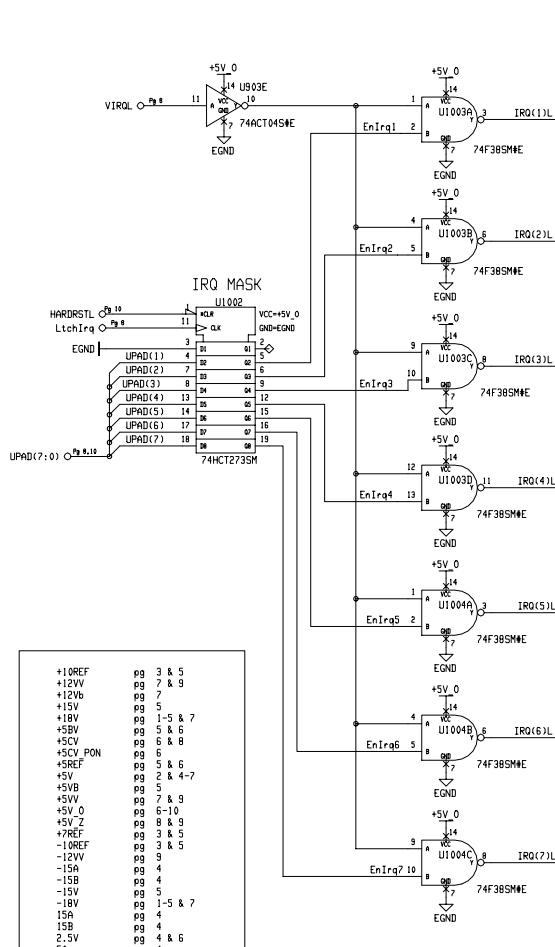
OUTPUT BUFFERS



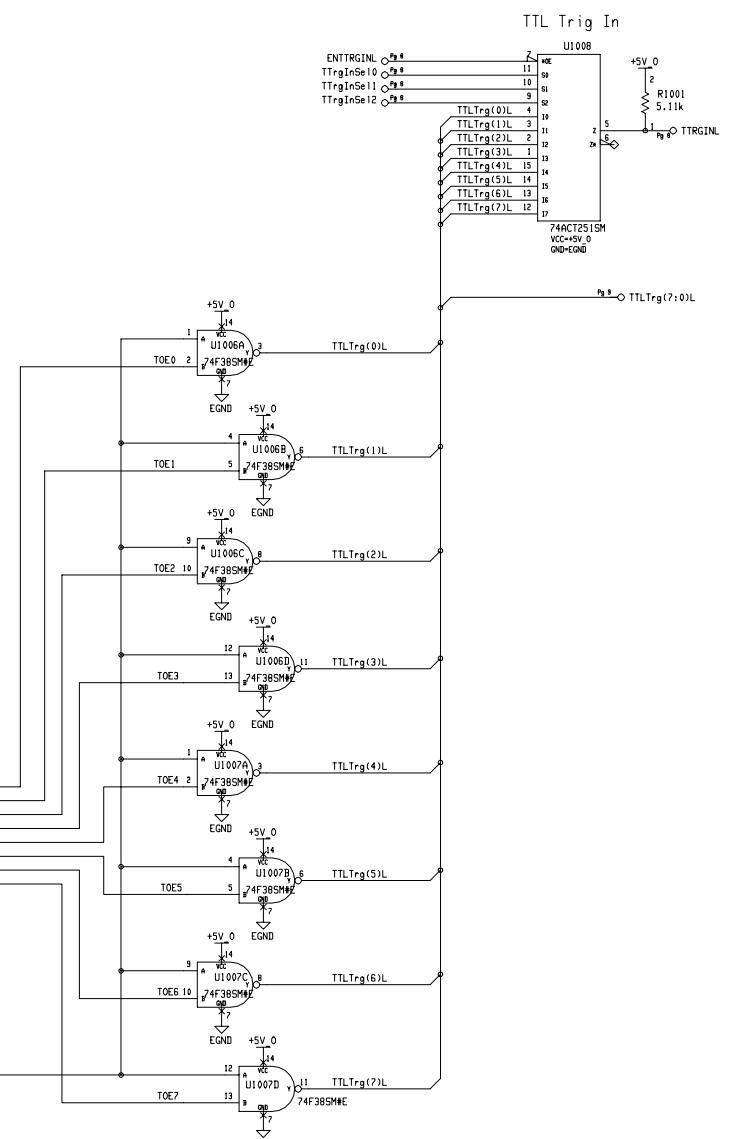
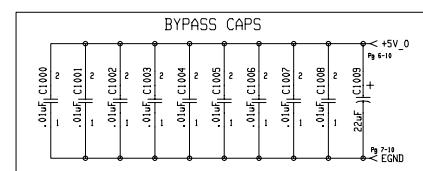
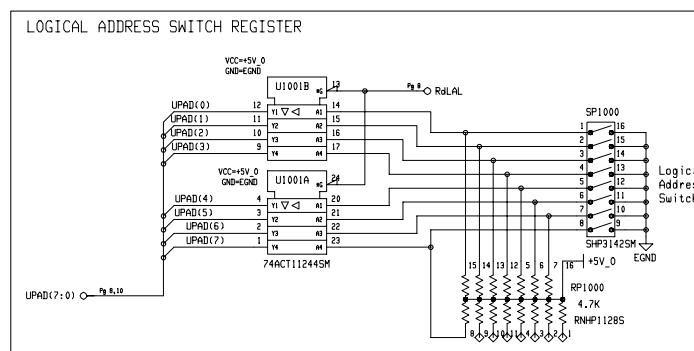
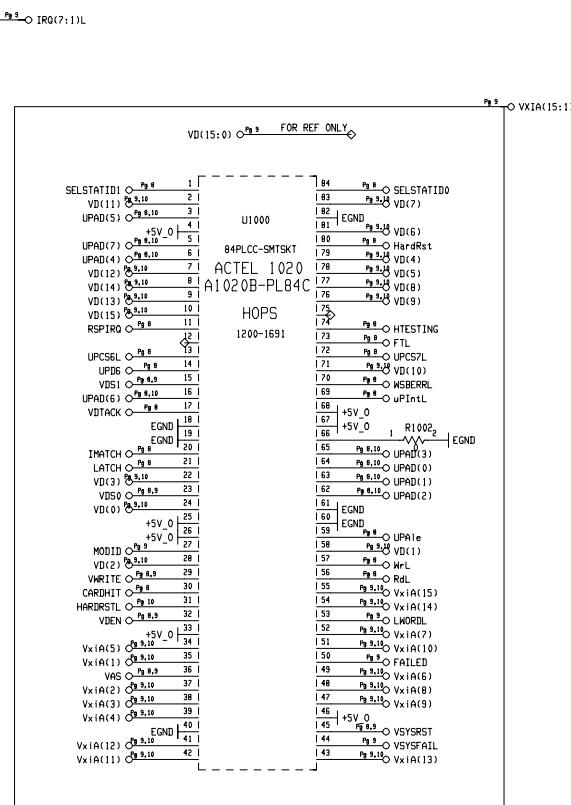
INPUT BUFFERS



**Agilent E1412A**  
**VXI Digital Multimeter**  
**E1412-66501**  
**Outguard Backplane Interface and**  
**LED Logic**  
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+1REF	Pg	3 & 5
+2IV	Pg	7 & 9
+12V	Pg	7
+15V	Pg	5
+18V	Pg	1-5 & 7
+5V	Pg	5 & 8
+5CV	Pg	6
+5CV_PON	Pg	6
+5REF	Pg	5 & 6
+5V	Pg	2 & 4-7
+5VB	Pg	5
+5V	Pg	5 & 9
+5V_0	Pg	6-10
+5V_2	Pg	8 & 9
+TREF	Pg	3 & 5
-1REFC	Pg	5 & 5
-12V	Pg	4
-15A	Pg	4
-15B	Pg	4
-15V	Pg	5
-18V	Pg	1-5 & 7
-15A	Pg	4
-15B	Pg	4
2.5V	Pg	4 & 6



EGND  
**Agilent E1412A**  
**VXI Digital Multimeter**  
**E1412-66501**  
**Outguard TTL Trig, IRQ Mask, LA**  
**Logic and ACTEL 1020**  
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### E1412-66501 / E1412-66511 Parts List

Reference Designator	QTY	Agilent Part Number	Description	MPN	Manufacturer
C100, C102, C103	3	0160-6839	CAP-FXD 470pF +-2pct 630 V POLYP-FL	2222-462-90005 ECPT1-10267G BFC246290005	VISHAY BC COMPONENTS ELECTRONIC CONCEPTS VISHAY
C1000-C1008, C751, C756, C801, C803, C904-C908	18	0160-5945	CAP-FXD 0.01uF +-10pct 50 V CER X7R	08055C103KAT A 223858016627 C0805C103K5RAC C2012X7R1H103K GRM216R71H103KA01J VJ0805Y103KXAMT	AVX YAGEO KEMET ELECTRONICS TDK MURATA MANUFACTURING VISHAY
C1009, C311, C312, C322, C323, C557, C800, C802	8	0180-4116	CAP-FXD 22uF +-20PCT 20V TA	TAJD226M020 293D226X0020D2E3 ESVD1D226M SK2-1D226M-RD0	AVX VISHAY NEC TOKIN ELNA
C104, C110, C113, C120, C150, C212, C308, C309, C314, C315, C319, C320, C403, C404, C407, C408, C409, C410, C500, C501, C502, C503, C504, C506, C558, C560, C765, C770, C804	29	0160-6497	CAP-FXD 0.1uF +-10pct 50 V CER X7R	12065C104KAT A 2238 581 15649 C1206C104K5RAC C3216X7R1H104KT GRM319R71H104KA01D VJ1206Y104KXAMT	AVX YAGEO KEMET ELECTRONICS TDK MURATA MANUFACTURING VISHAY
C105, C152, C326	3	0160-6731	CAP-FXD 1000pF +-10pct 50 V CER X7R	12065C102KAT A C1206C102K5RAC C3216X7R1H102K GRM316R71H102KD01D	AVX KEMET ELECTRONICS TDK MURATA MANUFACTURING
C106, C107, C111, C307	4	0160-5967	CAP-FXD 100pF +-5pct 50 V CER C0G	08055A101JAT A C0805C101J5GAC C2012COG1H101J GRM2165C1H101JA01D VJ0805A101JXAMT	AVX KEMET ELECTRONICS TDK MURATA MANUFACTURING VISHAY
C108, C151, C441, C442, C449	5	0160-6736	CAP-FXD 0.01uF +-10pct 50 V CER X7R	12065C103KAT A C1206C103K5RAC C3216X7R1H103K GRM316R71H103KD01D VJ1206Y103KXAMT	AVX KEMET ELECTRONICS TDK MURATA MANUFACTURING VISHAY
C109, C750, C752	3	0160-7438	CAP-FXD 0.01uF +-10pct 500 V CER X7R	12107C103KAT A 501S41W103KV6	AVX JOHANSON DIELECTRICS

**E1412-66501 / E1412-66511 Parts List**

Reference Designator	QTY	Agilent Part Number	Description	MPN	Manufacturer
C210, C400, C401, C402	4	0160-5954	CAP-FXD 220pF +-5pct 50 V CER C0G	08055A221JAT A 223858016605 C0805C221J5GAC C2012COG1H221J GRM2165C1H221JA01D	AVX YAGEO KEMET ELECTRONICS TDK MURATA MANUFACTURING
C301	1	0160-6778	CAP-FXD 0.22uF +-10pct 400 V POLYE-MET	HEW-671-220NF+-10%400V ME1-10095K	AMERICAN SHIZUKI ELECTRONIC CONCEPTS
C302	1	0160-7605	CAP-FXD 1.8pF +-13.89pct 1.5 kV CER C0G	MA30SA1R8CAA	AVX
C303	1	0160-6098	CAP-FXD 680pF +-5pct 50 V CER C0G	12065A681JAT A C1206C681J5GAC C3216CH1H681J GRM3165C1H681JD01D	AVX KEMET ELECTRONICS TDK MURATA MANUFACTURING
C304	1	0160-5973	CAP-FXD 6.8pF 50 V CER C0G	08055A6R8DATA C0805C689D5GAC C2012COG1H6R8D GRM2165C1H6R8CD01D	AVX KEMET ELECTRONICS TDK MURATA MANUFACTURING
C305, C705, C900, C901, C902, C903	6	0160-6096	CAP-FXD 470pF +-5pct 50 V CER C0G	12065A471JAT A C1206C471J5GAC C3216COG1H471J GRM3165C1H471JD01D	AVX KEMET ELECTRONICS TDK MURATA MANUFACTURING
C306	1	0160-5972	CAP-FXD 5.6pF 50 V CER C0G	08055A5R6DATA C0805C569D5GAC C2012COG1H5R6D GRM2165C1H5R6DD01D	AVX KEMET ELECTRONICS TDK MURATA MANUFACTURING
C310	1	0160-7736	CAP-FXD 1uF +-10PCT 16 V CER X7R	1206YC105KAT C1206C105K4RAC GRM31MR71C105KA01L	AVX KEMET ELECTRONICS MURATA MANUFACTURING
C313	1	0160-5968	CAP-FXD 82pF +-5pct 50 V CER C0G	08051A820JAT A C0805C820J5GAC C2012COG1H820J GRM2165C1H820JD01D	AVX KEMET ELECTRONICS TDK MURATA MANUFACTURING
C316, C318	2	0160-5892	CAP-FXD 0.22uF +-10PCT 63V POLYE-MET	MKS2-PCM5 MKT 1817 422 065 MMK5224K63J01L4 BULK	WIMA VISHAY EVOX/RIFA

**E1412-66501 / E1412-66511 Parts List**

Reference Designator	QTY	Agilent Part Number	Description	MPN	Manufacturer
C321	1	0160-5469	CAP-FXD 1uF +-10PCT 50 V POLYE-MET	MKS 2 1.0/10/50 PCM5 TR MMK5105K50J02TR18	WIMA EVOX/RIFA
C324, C327	2	0160-5959	CAP-FXD 33pF +-5pct 50 V CER C0G	08055A330JAT A C0805C330J5GAC C2012COG1H330J GRM2165C1H330JD01D	AVX KEMET ELECTRONICS TDK MURATA MANUFACTURING
C411	1	0180-3744	CAP-FXD 4.7uF +-20PCT 10V TA	TAJB475M010 293D475X0010B2E3 ESVB21A475M SK-1A475M-RB T491B475M010AS	AVX VISHAY NEC ELECTRONICS ELNA KEMET ELECTRONICS
C512	1	0180-4228	CAP-FXD 47uF +-20PCT 10V TA	TAJD476M010 293D476X0010D2WE3 49MC476D010M0AS ESVD1A476M	AVX VISHAY VISHAY BC COMPONENTS NEC ELECTRONICS
C704	1	0160-6729	CAP-FXD 3300pF +-10PCT 50V CER X7R	12065C332KAT A C1206C332K5RAC C3216X7R1H332K GRM316R71H332KD01D	AVX KEMET ELECTRONICS TDK MURATA MANUFACTURING
C753, C759, C762	3	0160-5947	CAP-FXD 1000pF +-10pct 50 V CER X7R	08055C102KAT A C0805C102K5RAC C2012X7R1H102K GRM216R71H102KA01D	AVX KEMET ELECTRONICS TDK MURATA MANUFACTURING
C754	1	0180-3751	CAP-FXD 1uF +-20PCT 35V TA	TAJB105M035 293D105X0035B2E3 ESVB21V105M SK-1V105M-RB	AVX VISHAY NEC ELECTRONICS ELNA
C755	1	0180-3163	CAP-FXD 220uF +-20pct 25 V AL-ELCLTLT	TVX1E221MAD	NICHICON
C757, C760	2	0180-0094	CAP-FXD 100uF +-20pct 35 V AL-ELCLTLT	TVX1V101MAD	NICHICON
C758	1	0180-4287	CAP-FXD 10uF +-20PCT 35V TA	TAJD106M035 293D106X0035D2WE3 ESVD1V106M	AVX VISHAY NEC ELECTRONICS
C761	1	0180-4733	CAP-FXD 22uF +-20pct 25 V TA	T495X226M025ASE225	KEMET ELECTRONICS
C763, C764, C766-C769	6	0180-4535	CAP-FXD 47uF +-20pct 20 V TA	TPSE476M020R0150 593D476X0020E2E3 T495X476M020ASE150	AVX VISHAY KEMET ELECTRONICS

**E1412-66501 / E1412-66511 Parts List**

Reference Designator	QTY	Agilent Part Number	Description	MPN	Manufacturer
C911, C912	2	0160-6222	CAP-FXD 0.1uF +/-10pct 50 V CER X7R	12105C104KAT A C1210C104K5RAC C3225X7R1H104K GRM32MR71H104KA01L VJ1210Y104KXAMT	AVX KEMET ELECTRONICS TDK MURATA MANUFACTURING VISHAY
	1	0160-3875	CAP-FXD 22pF +/-5pct 200 V CER C0G	RPE121-105C0G220J200V	MURATA MANUFACTURING
CR100, CR101, CR102, CR104	4	1901-1607	DIODE-PWR RECT 400V DO-214AB	S3G S3G-E3	ARROW ELECTRONICS VISHAY
CR103, CR201	2	1902-1565	DIODE-ZNR 4.7V 5pct TO-236 (SOT-23)	BZX84-C4V7 BZX84C4V7LT1G BZX84-C4V7	PHILIPS ON SEMICONDUCTOR NXP
CR202	1	1901-1378	DIO DO41 1.6KVDC	GP10Y R1800T	VISHAY RECTRON
CR203	1	1902-1592	DIODE-ZNR 5.1V 5pct TO-236 (SOT-23)	BZX84C5V1 BZX84C5V1LT1G BZX84C5V1	PHILIPS ON SEMICONDUCTOR NXP
CR302, CR303, CR403, CR404, CR500, CR553, CR701, CR702, CR705	9	1906-0291	DIODE-DUAL 70V 100MA TO-236AA	BAV99 BAV99 BAV99LT1G BAV99_X BAV99	PHILIPS FAIRCHILD SEMICONDUCTOR ON SEMICONDUCTOR INFINEON TECHNOLOGIES NXP
CR304-CR307, CR401, CR402	6	1902-1541	DIODE-ZNR 3.3V 5pct TO-236 (SOT-23)	BZX84C3V3LT1G BZX84C3V3 BZX84C3V3	ON SEMICONDUCTOR PHILIPS NXP
CR550, CR551, CR552, CR554, CR750, CR751	6	1901-1373	DIODE-PWR RECT 200V 1A 35NS	MURS120T3G	ON SEMICONDUCTOR
CR555	1	1902-1609	DIODE-ZNR 6.2V 5pct PD=1.5W IR=5UA	1SMB5920BT3G	ON SEMICONDUCTOR
CR801, CR802	2	1901-1346	DIODE-V-SUPPR DO-214AB	SMCJ43CA	VISHAY
CR900, CR901	2	1990-1364	LED-LAMP ARRAY LUM-INT=800UCD	553-0321	DIALIGHT
E100, E101	2	1970-0212	TUBE TYS 1500V	CG3-1.5L	SRC DEVICES
F101	1	2110-0957	FUSE (METRIC) 3.15A 250V NTD FE UL-REC	02163.15 GDA-3.15A	LITTELFUSE COOPER INDUSTRIES
F750, F752	2	2110-0945	FUSE-SURFACE MOUNT 3A 125V NTD BI UL-F	0451003	LITTELFUSE
FB701, FB702	2	9170-1549	CORE-SHIELDING BEAD	4330-030-36526 28F0121-1SR-10 2743037447	FERROXCUBE USA STEWARD FAIR RITE PRODUCTS
FB750	1	9170-1682	CORE-SHIELDING BEAD	FBMJ2125HS420	TAIYO YUDEN

**E1412-66501 / E1412-66511 Parts List**

Reference Designator	QTY	Agilent Part Number	Description	MPN	Manufacturer
FH101	1	2110-0869	FUHLR-HPZ-PC 10A 250V	0031.3558	SCHURTER
J150-J154	5	E1412-62111	ASSEMBLY, INPUT JACK	E1412-62111	MOUNTAIN MOLDING
	1	1NG4-0001	CHAMELEON II DMM SWTCH CHIP 44-PLCC -		
	1	1NG4-0001-SC	CHAMELEON II DMM SWITCH CHIP 44-PLCC -		
	1	1NG4-0001-SC	CHAMELEON II DMM SWITCH CHIP 44-PLCC -		
	x	1NG4-1501	IC ASIC WAFER CHAMELEON II		
J702, J703	2	1250-1842	CONNECTOR-RF BNC FEMALE PC-W-STDFS	31-5506 5227677-1	AMPHENOL TYCO ELECTRONICS AMP
JM500	1	1251-5380	CONN-HDR VERT 2-PIN 2.54MM 1-ROW	68000-102HLF	FCI FRAMATOME BERG
JM501, R1002, R430, R801	4	0699-1503	RESISTOR 0 CWM	CRCW12060000ZSE_ RK73Z2BT MCR18____J000 232271191005	VISHAY KOA ROHM YAGEO
K101	1	0490-1914	RLY-REED 2A,5VDC COIL	BT05-BV50324 3200-0121	MEDER ELECTRONIC COTO WABASH
K102, K103, K104	3	0490-1789	RELAY	G6AK-274P-STLT-US-DC5 DS2E-SL2-5V-C-H305	OMRON MATSUSHITA
L101, L106	2	9140-1244	INDUCTOR 1mH +-5pct 3.4W-mmX4.8LG-mm	ELJ-FB102JF NL453232T-102J-PF	MATSUSHITA TDK
L102, L150	2	9140-1237	INDUCTOR 4.7uH +-5pct 2.8W-mmX3.4LG-mm	NLV32T-4R7J-PF KL32T____4R7J	TDK KOA
L103, L104, L110, L111	4	9140-1238	INDCTR-FXD 10uH +-5PCT Q 30 2.8W X 3.4LG	NLV32____-100J-PF KL32T____100J	TDK KOA
L401, L402, L403, L501	4	9170-1431	CORE-SHIELDING BEAD	HF50ACB-453215	TDK
L404	1	9170-1506	CORE-SHIELDING BEAD	HF50ACB201209 LI0805F110R	TDK STEWARD
L750	1	9140-0713	INDUCTOR 120uH +-15pct .46D-INX.9LG-IN	IHD-3 120 UH +/-15% RL-1283-120	VISHAY RENCO ELECTRONICS
L751, L752, L753	3	9140-1175	INDUCTOR-FIXED L:1 MH,-0pct,+30pct at 0.35	PE-50501-004	TECHNITROL
L900, L901, L902, L903	4	9140-1100	INDUCTOR 330nH +-5pct 2.8W-mmX3.4LG-mm	NLV32T-R33J-PF KL32T____R33J	TDK KOA
LBL1	1	7121-0850	LABEL-ANTISTATIC 1.81-IN-WD 2.5-IN-LG	7101 7101 7121-0850	R S HUGHES 3M GM NAMEPLATE
LBL2	1	7121-5729	LBL-LNE-PTR; 1.5-IN-WD X .25-IN-LG	THT-45-457-10	BRADY

**E1412-66501 / E1412-66511 Parts List**

Reference Designator	QTY	Agilent Part Number	Description	MPN	Manufacturer
LBL3	1	9320-6241	LBL-PG-PTR: .625-IN-WD X .25-IN-LG	9320-6241	BRADY
OTH1	1	9222-0981	POUCH-STAT-DISS-CNDCT PE	PACK 66 PURE-STAT I	SPECIALTY ENTERPRISES MAINE POLY
P1	1	1252-1596	CONN-POST TYPE 2.54-PIN-SPCG-MTG-END	10-8557-096-002-025 536010-5 DIN-96CPC-SRI-TR	KYOCERA TYCO ELECTRONICS AMP 3M
P2	1	1252-4743	CONN-POST TYPE 2.54-PIN-SPCG-MTG-END	5536011-5 10-8557-096-002-026	TYCO ELECTRONICS AMP KYOCERA
PCB1	1	E1412-26501	BLANK PC BOARD	E1412-26501	AGILENT TECHNOLOGIES EXT VIEW
Q104, Q201	2	1855-0752	TRANSISTOR J-FET N-CHAN D-MODE TO-236	MMBF4392 PMBF4392 PMBF4392	FAIRCHILD SEMICONDUCTOR PHILIPS NXP
Q150, Q151, Q152, Q153	4	1854-1014	TRANSISTOR NPN SI TO-236AA PD=350MW	CMPT6429 MMBT6429LT1G	CENTRAL SEMICONDUCTOR ON SEMICONDUCTOR
Q202	1	5185-6749	LTB FOR 1855-0863		
	1	1855-0863	XSTR PJFET SEL		
Q203, Q204, Q205, Q206, Q207, Q208, Q209, Q210	8	1853-0727	TRANSISTOR PNP SI SOT-23 (TO-236AB)	MMBT6520LT1G	ON SEMICONDUCTOR
Q211	1	5185-6755	LTB FOR 1855-0865		
	1	1855-0865	TRANSISTOR J-FET N-CHAN D-MODE TO-236		
Q301, Q750, Q751	3	5188-2553	LTB FOR 1855-0800		
	1	1855-0800	TRANSISTOR MOSFET N-CHAN E-MODE SI T	NTD3055L104G	ON SEMICONDUCTOR
R1001, R750, R910, R913	4	0699-1385	RES-FXD 5.11K +-1PCT .125W TC 0+-100	CRCW12065K11FKE_ RK73H2BT_5111F MCR18__F5111 232272465112L	VISHAY KOA ROHM YAGEO
R101, R102, R315	3	0699-1327	RESISTOR 1M +-1pct .125W TKF TC=0+-100	CRCW12061M00FKE_ RK73H2BT_1004F MCR18__F1004 232272461005L	VISHAY KOA ROHM YAGEO
R103, R118, R405, R551	4	0699-1380	RESISTOR 3.16K +-1pct .125W TKF TC=0+-100	CRCW12063K16FKE_ RK73H2BT_3161F MCR18__F3161 232272463162	VISHAY KOA ROHM YAGEO
R104, R105, R106, R107, R108, R109, R110, R111	8	0699-3409	RESISTOR 13K +-5pct 1W TKF TC=0+-200	CRCW251213K0JNE_ MCR100__J133 232276260133	VISHAY ROHM YAGEO

**E1412-66501 / E1412-66511 Parts List**

Reference Designator	QTY	Agilent Part Number	Description	MPN	Manufacturer
R112, R113, R406, R502, R562	5	0699-1330	RESISTOR 100K +-1pct .125W TKF TC=0+-100	CRCW1206100KFKE_RK73H2BT_1003F MCR18_F1003 232272461004L	VISHAY KOA ROHM YAGEO
R114, R115, R116, R117, R119, R306, R308, R310, R316, R325, R326	11	0699-1423	RESISTOR 215 +-1pct .125W TKF TC=0+-100	CRCW1206215RFKE_RK73H2BT_2150F MCR18_F2150 232272462151L	VISHAY KOA ROHM YAGEO
R120	1	0699-1514	RESISTOR .1 +-1pct 5W MFS TC=+30/-10	LVR-5-43 .1OHM 1%	VISHAY
R121	1	0699-5049	RESISTOR 5 OHM +-1pct .125W TF TC=0+-12	VTA56V4 5R 1.0% T/R	VISHAY
R122, R124, R309, R313	4	0699-1329	RESISTOR 6.19K +-1pct .125W TKF TC=0+-100	CRCW12066K19FKE_RK73H2BT_6191F MCR18_F6191 232272466192	VISHAY KOA ROHM YAGEO
R126, R127, R131, R314, R319, R323, R324, R327, R702	9	0699-1398	RESISTOR 21.5K +-1pct .125W TKF TC=0+-100	CRCW120621K5FKE_RK73H2BT_2152F MCR18_F2152 232272462153	VISHAY KOA ROHM YAGEO
R130, R441	2	0699-1394	RESISTOR 14.7K +-1pct .125W TKF TC=0+-100	CRCW120614K7FKE_RK73H2BT_1472F MCR18_F1472 232272461473L	VISHAY KOA ROHM YAGEO
R150, R196, R504, R506, R507, R510, R511, R512, R518, R560, R564, R703	12	0699-1391	RESISTOR 10K +-1pct .125W TKF TC=0+-100	CRCW120610K0FKE_RK73H2BT_1002F MCR18_F1002 232272461003L	VISHAY KOA ROHM YAGEO
R151, R320	2	0699-1427	RESISTOR 316 +-1pct .125W TKF TC=0+-100	CRCW1206316RFKE_RK73H2BT_3160F MCR18_F3160 232272463161	VISHAY KOA ROHM YAGEO
R160	1	0686-4715	RESISTOR 470 +-5pct .5W CC TC=0+529		
R170, R171, R172, R173, R180, R181, R182, R183	8	0699-3406	RESISTOR 24K +-5pct 1W TKF TC=0+-200	CRCW251224K0JNE_MCR100_J243 232276260243	VISHAY ROHM YAGEO

**E1412-66501 / E1412-66511 Parts List**

Reference Designator	QTY	Agilent Part Number	Description	MPN	Manufacturer
R197, R403, R420	3	0699-1389	RESISTOR 8.25K +-1pct .125W TKF TC=0+-100	CRCW12068K25FKE_RK73H2BT_8251F MCR18_F8251 232272468252L	VISHAY KOA ROHM YAGEO
R201	1	0699-3404	RES-FXD 400K +-1PCT 0.125W TC=0+-2	PR1/8A-TC2-400K-1% UXBT400K00F UXBT400K00F	PRECISION RESISTIVE PRODUCTS VISHAY BC COMPONENTS VISHAY
R202	1	0699-4416	RESISTOR 40K +-1pct .6W MF TC=0+-5	S102C 40K 1.0%	VISHAY
R203, R204, R205, R206	4	0699-1332	RESISTOR 196K +-1pct .125W TKF TC=0+-100	CRCW1206196KFKE_RK73H2BT_1963F MCR18_F1963 232272461964	VISHAY KOA ROHM YAGEO
R207, R751	2	0699-1377	RESISTOR 2.37K +-1pct .125W TKF TC=0+-100	CRCW12062K37FKE_RK73H2BT_2371F MCR18_F2371 232272462372L	VISHAY KOA ROHM YAGEO
R290, R305, R307	3	0699-1374	RESISTOR 1.78K +-1pct .125W TKF TC=0+-100	CRCW12061K78FKE_RK73H2BT_1781F MCR18_F1781 232272461782L	VISHAY KOA ROHM YAGEO
R301, R302	2	0699-2469	RESISTOR 500K +-0.25pct .25W TF TC=0+-5	PR 1/4 TC5 500K.25% PTF-65500K0CT-16	PRECISION RESISTIVE PRODUCTS VISHAY
R303	1	0699-1307	RES-FXD 1.96KOHM +-0.1PCT 0.1W TF TC 0+-	PTF-561K96BT-16 PR1/10TC51K96.1% UXB02070G1961B	VISHAY PRECISION RESISTIVE PRODUCTS VISHAY BC COMPONENTS
R304	1	0699-0481	RESISTOR 200K +-1pct .1W TF TC=0+-10	PR1/10TC10200K01% PTF-56200K0FT-13 UXB0207-10 0,1%RP 200K	PRECISION RESISTIVE PRODUCTS VISHAY VISHAY BC COMPONENTS
R311, R312, R322	3	0699-1412	RESISTOR 75K +-1pct .125W TKF TC=0+-100	CRCW120675K0FKE_RK73H2BT_7502F MCR18_F7502 232272467503L ERJ8EFN7502	VISHAY KOA ROHM YAGEO MATSUSHITA

**E1412-66501 / E1412-66511 Parts List**

Reference Designator	QTY	Agilent Part Number	Description	MPN	Manufacturer
R317, R440	2	0699-1406	RESISTOR 42.2K +-1pct .125W TKF TC=0+-100	CRCW120642K2FKE_RK73H2BT_4222F MCR18_F4222 232272464223	VISHAY KOA ROHM YAGEO
R318, R407, R408, R421, R501, R508, R509, R513, R514, R515, R561, R705, R707, R900, R901, R902, R903, R909	18	0699-1318	RESISTOR 1K +-1pct .125W TKF TC=0+-100	CRCW12061K00FKE_RK73H2BT_1001F MCR18_F1001 232272461002L	VISHAY KOA ROHM YAGEO
R321	1	0699-1382	RESISTOR 3.83K +-1pct .125W TKF TC=0+-100	CRCW12063K83FKE_RK73H2BT_3831F MCR18_F3831 232272463832L	VISHAY KOA ROHM YAGEO
R409	1	0699-1372	RESISTOR 1.47K +-1pct .125W TKF TC=0+-100	CRCW12061K47FKE_RK73H2BT_1471F MCR18_F1471 232272461472	VISHAY KOA ROHM YAGEO
R422	1	0699-1360	RESISTOR 46.4 +-1pct .125W TKF TC=0+-100	CRCW120646R4FKE_RK73H2BT_46R4F MCR18_F46R4 232272464649	VISHAY KOA ROHM YAGEO
R442	1	0699-2127	RESISTOR 36.5K +-1pct .125W TKF TC=0+-100	CRCW120636K5FKE_RK73H2BT_3652F MCR18_F3652 232272463653	VISHAY KOA ROHM YAGEO
R449, R752, R753	3	0699-1415	RESISTOR 100 +-1pct .125W TKF TC=0+-100	CRCW1206100RFKE_RK73H2BT_1000F MCR18_F1000 232272461001L	VISHAY KOA ROHM YAGEO
R505	1	0699-1386	RESISTOR 5.62K +-1pct .125W TKF TC=0+-100	CRCW12065K62FKE_RK73H2BT_5621F MCR18_F5621 232272465622L	VISHAY KOA ROHM YAGEO
R552, R554	2	0699-1424	RESISTOR-FXD 237 +-1pct .25W TC 0+-100 12	CRCW1206237RFKE_RK73H2BT_2370F MCR18_F2370	VISHAY KOA ROHM

**E1412-66501 / E1412-66511 Parts List**

Reference Designator	QTY	Agilent Part Number	Description	MPN	Manufacturer
R553	1	0699-2431	RESISTOR 3.32K +-1pct .125W TKF TC=0+-100	CRCW12063K32FKE_RK73H2BT_3321F MCR18_F3321 232272463322	VISHAY KOA ROHM YAGEO
R701, R756, R758	3	0699-3408	RES-FXD 1 KOHM +-5PCT 1W TKF TC 0+-200	CRCW25121K00JNE_MCR100_J102 RK73BW3AT_102J	VISHAY ROHM KOA
R706	1	0699-3407	RES-FXD 100 OHM +-5PCT 1W TC 0+-200 251	CRCW2512100RJNE_RK73B3AT_101J MCR100_J101	VISHAY KOA ROHM
R754, R755	2	0699-1432	RESISTOR 511 +-1pct .125W TKF TC=0+-100	CRCW1206511RFKE_RK73H2BT_5110F MCR18_F5110 232272465111L	VISHAY KOA ROHM YAGEO
R757	1	0699-3430	RESISTOR 150 +-5pct 1W TKF TC=0+-200	CRCW2512150RJNE_MCR100_J151 232276260151	VISHAY ROHM YAGEO
R759	1	0699-1408	RESISTOR 51.1K +-1pct .125W TKF TC=0+-100	CRCW120651K1FKE_RK73H2BT_5112F MCR18_F5112 232272465113L	VISHAY KOA ROHM YAGEO
R760	1	0699-3045	RESISTOR 5.11K +-1pct .1W TKF TC=0+-100	CRCW08055K11FKE_RK73H2AT_5111F MCR10_F5111 232273465112 MC08055111-FT	VISHAY KOA ROHM YAGEO RCD COMPONENTS
R761	1	0699-1418	RESISTOR 133 +-1pct .125W TKF TC=0+-100	CRCW1206133RFKE_RK73H2BT_1330F MCR18_F1330 232272461331	VISHAY KOA ROHM YAGEO
R762	1	0811-3904	RES-FXD .1OHM +-1PCT 1W TC 0 +- 90	S-2 .1 OHMS +-1% WSC-1 0R1 1%	RIEDON VISHAY
R763	1	0699-1431	RESISTOR 464 +-1pct .125W TKF TC=0+-100	CRCW1206464RFKE_RK73H2BT_4640F MCR18_F4640 232272464641	VISHAY KOA ROHM YAGEO

**E1412-66501 / E1412-66511 Parts List**

Reference Designator	QTY	Agilent Part Number	Description	MPN	Manufacturer
R764	1	0699-1425	RESISTOR 261 +-1pct .125W TKF TC=0+-100	CRCW1206261RFKE_RK73H2BT_2610F MCR18_F2610 232272462611L	VISHAY KOA ROHM YAGEO
R765	1	0699-3034	RESISTOR 1K +-1pct .1W TKF TC 0+-100	CRCW08051K00FKE_RK73H2AT_1001F 232273461002L MCR10_F1001 MC08051001-FT	VISHAY KOA YAGEO ROHM RCD COMPONENTS
R800	1	0699-3058	RESISTOR 100 +-1pct .1W TKF TC 0+-100	CRCW0805100RFKE_RK73H2AT_1000F 232273461001L MCR10_F1000	VISHAY KOA YAGEO ROHM
R904	1	0699-1437	RESISTOR 825 +-1pct .125W TKF TC=0+-100	CRCW1206825RFKE_RK73H2BT_8250F MCR18_F8250 232272468251	VISHAY KOA ROHM YAGEO
R911, R912	2	0699-1455	RESISTOR 499K +-1pct .125W TKF TC=0+-100	CRCW1206499KFKE_RK73H2BT_4993F MCR18_F4993 232272464994	VISHAY KOA ROHM YAGEO
RP1000, RP800	2	1810-1128	NET-RES 15 4.7K OHM 16-PIN	767161472G SOMC16-01-472G 4816P-2-472LF	CTS VISHAY BOURNS
RV100, RV101, RV102	3	0837-0196	VOLTAGE SUPPRESSOR VNOM=430V, 10A PE	V430MT3A	LITTELFUSE
RVT1, RVT2, RVT3, RVT4	4	0361-1393	RIVET-BLIND DR-PIN UNIV-HD .098DIA	1189-2510	TEXTRON
SD1	1	1260-1378	PGA PACKAGE 32 PINS	IPK32FO-8627B	N G K SPARK PLUGS
SD1	1	1260-1378	PGA PACKAGE 32 PINS	IPK32FO-8627B	N G K SPARK PLUGS
SD2	x	7225-0456	GOLD WIRE .001IN 99.99PCT AU	7225-0456 7225-0456	SECON METALS SPM
SD3	1	3980-0739	LID W/S 91 .60X.60X.056 026 B	KE-90315	KYOCERA
SD3	1	3980-0739	LID W/S 91 .60X.60X.056 026 B	KE-90315	KYOCERA
SD4	x	5182-1505	LABEL WHITE POLY .50 X .50		
SD57	x	0470-1894	ADHESIVE ABLESTIK ABLEBOND 84-3LV EPX	ABLEBOND 84-3LV	IMPERIAL CHEMICAL INDUSTRIES
SD60	1	1QJ6-4001-1	TESTED DIE ON WAFER, 1QJ6		
	x	5061-1QJ6	Sapphire 1QJ6 - Post Titanium Deposition		
	x	5061-5511	DEPED SAPHIRE WAFER		

**E1412-66501 / E1412-66511 Parts List**

Reference Designator	QTY	Agilent Part Number	Description	MPN	Manufacturer
SD60	1	4340-0112	SUBSTRATE-SPHR 2-IN OD .013-IN THK ; SAP	4340-0112 4340-0112	JOHNSON MATTHEY UNION CARBIDE
	x	5081-9152	TRAY PLAS CON 40CAV .90X.90X.3		
	x	1NB4-5035IN	INPUT RES. NTWRK- PGA PKG INT		
SD60	1	1QJ6-4001-1	TESTED DIE ON WAFER, 1QJ6		
	x	5061-1QJ6	Sapphire 1QJ6 - Post Titanium Deposition		
	x	5061-5511	DEPED SAPHIRE WAFER		
	1	4340-0112	SUBSTRATE-SPHR 2-IN OD .013-IN THK ; SAP	4340-0112 4340-0112	JOHNSON MATTHEY UNION CARBIDE
	x	5081-9152	TRAY PLAS CON 40CAV .90X.90X.3		
SP1000	1	3101-3142	SWITCH-DIP SURF-MT-SL SPST 0.025A 24VDC	90YY2008SGWT 11P4248	GRAYHILL CTS
T750	1	9100-4844	TRANSFORMER-PULSE	IPL-1229-184	VISHAY
U1	1	1QJ6-4001	IC INPUT RES. NET 1QJ6-4001		
U1	1	1QJ6-4001	IC INPUT RES. NET 1QJ6-4001		
U1000	1	E1412-88805	PRGMD 1820-6601		
	1	1820-6601	IC PLD FPGA-ANT-FS UNPRGMD CMOS 1020	A1020B-PLG84C	ACTEL
U1001	1	1820-6620	IC DRVR CMOS/ACL BUS OCTL	74ACT11244DW	TEXAS INSTRUMENTS
U1002, U1005	2	1820-5475	IC FF CMOS/HCT D-TYPE POS-EDGE-TRIG C	74HCT273D 74HCT273D	PHILIPS NXP
U1003, U1004, U1006, U1007, U900	5	1820-4861	IC BFR TTL/F NAND QUAD 2-INP	N74F38D-T N74F38D-T	PHILIPS NXP
U1008	1	1820-8830	IC MUXR/DATA-SEL CMOS/ACT 8-TO-1-LINE	74ACT251SCX	FAIRCHILD SEMICONDUCTOR
U102	1	1NB4-5035	RALF RESISTOR NET		
	1	1NB4-5035SC	INPUT RES. NTWRK- PGA PKG SUBC		
U103, U153, U201, U400, U401	5	1826-2420	IC OP AMP LP DUAL 8 PIN PLSTC-SOIC	AD706JRZ	ANALOG DEVICES
U104	1	1855-0864	TRANSISTOR-FET DUAL	LS844-S08-SE	LINEAR INTEGRATED SYSTEMS
U105, U110, U307	3	5065-6644	LTB 1826-2558		
	1	1826-2558	IC OP AMP WB SINGLE 8 PIN PLSTC-SOIC		
U106, U420	2	1826-1925	IC OP AMP LOW-NOISE SINGLE 8 PIN	OPA27GU/_E4 OP27GSZ	TEXAS INSTRUMENTS ANALOG DEVICES
U150	1	1820-8937	IC-SCX6B04AKP CMOS GATE ARRAY	SCX6B04AKP/V0	NATIONAL SEMICONDUCTOR
U301	1	1826-2436	IC OP AMP WB 8 PIN PLSTC-SOIC	LF356M -NOPB	NATIONAL SEMICONDUCTOR
U302	1	1826-2339	D/A 8-BIT 16-P-SOIC CMOS	AD7524JRZ	ANALOG DEVICES
U303, U305, U312	3	5185-6798	LTB OF 1826-2437 (E1412-66501)		
	1	1826-2437	IC OP AMP WB 8 PIN PLSTC-SOIC		

**E1412-66501 / E1412-66511 Parts List**

Reference Designator	QTY	Agilent Part Number	Description	MPN	Manufacturer
U304	1	1826-1985	ANALOG SWITCH 4 SPST 16 -P-SOIC	DG411DY-E3 ADG411BR DG411DY	VISHAY ANALOG DEVICES INTERSIL
U306	1	1826-1609	ANALOG SWITCH 4 SPST 16 -P-SOIC	DG211BDY-E3 ADG211AKR	VISHAY ANALOG DEVICES
U308	1	1826-2445	RMS/DC 16-P-SOIC MISC	AD637JR	ANALOG DEVICES
U309, U311	2	1820-5790	IC SHF-RGTR CMOS/HC SYNCHRO SERIAL-IN	74HC4094D 74HC4094D	PHILIPS NXP
U310	1	1826-1572	IC COMPARATOR PRCN DUAL 8 PIN PLSTC-S	LM393D LM393DR2G	TEXAS INSTRUMENTS ON SEMICONDUCTOR
U402	1	1826-1991	IC OP AMP HS SINGLE 8 PIN PLSTC-SOIC	AD711JRZ	ANALOG DEVICES
U403	1	1826-1249	IC PWR MGT-V-REF-FXD 6.8/7.1V TO-46 PKG	LM399AH#40014	LINEAR TECHNOLOGY
U404, U699	2	1820-5937	IC FF CMOS/AC D-TYPE POS-EDGE-TRIG	74AC74SCX-NL MC74AC74DG	FAIRCHILD SEMICONDUCTOR ON SEMICONDUCTOR
U405	1	1813-0827	CRYSTAL OSC 12.000MHZ 0.01pct	SG-615P 12.000MC	EPSON TOYOCOM
U411	1	1821-3334	IC MUXR/DATA-SEL CMOS/HC 2-TO-1-LINE TR	74HC4053D 74HC4053D	PHILIPS NXP
U500	1	1821-1479	IC 16-BIT MCU 16-MHZ CMOS 68-PLCC	C	INTEL
U501	1	1820-8907	IC-SCX6206AK0	SCX6206AK0/V4	NATIONAL SEMICONDUCTOR
U502 (E1412-66501)	1	<b>E1412-88812</b>	Programmed part	<b>E1412-88812</b>	AVNET
programmed for the -66501	1	1818-5680	IC 2M-BIT OTP 120-NS CMOS	M27C2001-12C1E	STMICROELECTRONICS
U502 (E1412-66511)	1	<b>E1412-88822</b>	Programmed part	<b>E1412-88822</b>	AVNET
programmed for the -66511	1	1818-5680	IC 2M-BIT OTP 120-NS CMOS	M27C2001-12C1E	STMICROELECTRONICS
U503	1	1818-4777	IC 256K-BIT SRAM 70-NS CMOS	CY62256LL-70SNCT UPD43256BGU-70L	CYPRESS SEMICONDUCTOR NEC ELECTRONICS
U505	1	1818-5236	IC 4K-BIT EEPROM 500-NS CMOS	93LC66B/SN	MICROCHIP TECHNOLOGY
U506, U704	2	1990-1552	OPTO-ISOLATOR LED-IC GATE IF=10MA-MAX	HCPL-2211#500	AVAGO TECHNOLOGIES
U550	1	1821-0055	IC SCHMITT-TRIG CMOS/ACT NAND QUAD 2	MC74ACT132DG	ON SEMICONDUCTOR
U551	1	1826-3131	IC PWR MGT-V-REG-ADJ-POS 5/20V 5 PINS	LM2941CS -NOPB	NATIONAL SEMICONDUCTOR
U552	1	1826-3208	IC PWR MGT-V-REG-ADJ-NEG -2/-25V 5 PINS	LM2991S-NOPB	NATIONAL SEMICONDUCTOR
U553	1	5041-6251	LTB 1826-2461 FOR E1412-66501		
	1	1826-2461	IC PWR MGT-V-REG-FXD-POS 4.75/5.25V 5		
U705, U904	2	1820-7312	IC SCHMITT-TRIG CMOS/ACT INV HEX	MC74ACT14DR2G SN74ACT14D	ON SEMICONDUCTOR TEXAS INSTRUMENTS
U750	1	1826-2460	IC PWR MGT-V-REG-SWG 4.95/5.05V 16 PINS	TL594CD	TEXAS INSTRUMENTS

**E1412-66501 / E1412-66511 Parts List**

Reference Designator	QTY	Agilent Part Number	Description	MPN	Manufacturer
U800	1	E1412-88815	PRGMD 1820-8905	E1412-88815	ARROW ELECTRONICS
	1	1820-8905	IC 8-BIT MCU W/4K EPROM;12 MHZ	EE87C511SF76	INTEL
U801	1	E1412-88814	PRGMD 1820-8070	E1412-88814	ATLAS SERVICES
	1	1820-8070	IC PLD FPGA-ANT-FS UNPRGMD CMOS 1010	A1010B-PLG68C	ACTEL
U903	1	1820-5939	IC INV CMOS/ACT HEX 14-SOIC	MC74ACT04DG 74ACT04SCX_NL	ON SEMICONDUCTOR FAIRCHILD SEMICONDUCTOR
	1	1826-2792	IC PWR MGT-UND-V-SEN 8 PINS P-SOIC PKG	SG34164DM MC34164D-5_G	LINFINITY MICROELECTRONICS ON SEMICONDUCTOR
U906, U907	2	1820-7672	IC TRANSCEIVER TTL/ALS BUS OCTL	SN74ALS245A-1DW	TEXAS INSTRUMENTS
U908	1	1820-5054	IC MV CMOS/HC MONOSTBL RETRIG DUAL	MM74HC123AMX TC74HC123AFN	FAIRCHILD SEMICONDUCTOR TOSHIBA
US403	1	1200-1672	SOCKET-IC-DIP 4-CONT DIP-SLDR	SD-102-T-2-N	SAMTEC
Y701	1	0410-4009	RESONATOR-CERAMIC 12.0MHZ; STABILITY=	PBRC-12.00HR07	KYOCERA

# E1412A Instrument Modification to E1412A-J01

Modification – E1412A-J01 (converts E1412-66501 to E1412-66511)

Revision Date – 10/17/2005

## Description:

### 1. Range change

Agilent will add a "diag:poke" to enable a special mode in the E1412 that provides special ohm functionality, which will be a volatile setting. Agilent will also provide a "diag:peek?" query to return the setting.

Agilent will modify the behavior of "RES:RANG", "CONF:RES" and "MEAS:RES?" (and their FRES equivalents) such that when given a definite range between 1.2K and 3.03K, we will enable a special "3 KOhm range" which differs from the 10 KOhm range in that it will use a 10x stronger current source, and internally measure the voltage with a x1 gain rather than x10. Agilent will do the same with a pseudo "30 KOhm range" which makes the equivalent modifications to the 100 KOhm range.

Agilent will modify the behavior of "RES:RANG", "CONF:RES" and "MEAS:RES?" (and their FRES equivalents) such that when given a definite range value between 120K and 303K, we will enable a special "300 KOhm range" which differs from the 1 MOhm range in that it will use a 2x stronger current source (10 uA vs. 5uA), and internally measure the voltage with the same x1 gain as the 1M range.

This special mode will not guarantee flagging of overrange conditions, nor will Agilent attempt to implement this behavior with autorange on.

Agilent will provide a special ROM, so it does not have to coexist in the standard instrument firmware.

There will be no calibration required or executed for these special pseudo ranges. Agilent will synthesize the necessary calibration constants from other internal cal constants.

### 2. E1412A EXTENDED SPECIFICATIONS:

This option provides additional accuracy specifications for the E1412A when calibrated at any temperature in the range of 0 degC to +37.7 degC.

#### Specification Changes:

For  $T_{cal} < 23C \pm 1C$  and  $T_{cal} < 37.7C$  and  $T_{cal} > 0C$ , the following additional specifications apply.

1. The 24 hour, 90 day and 1 year specification temperature ranges of  $\pm 1C$  and  $\pm 5C$  are relative to the actual calibration temperature  $T_{cal}$ .
2. The Temperature Coefficient specification applies to temperatures beyond  $T_{cal} \pm 5C$ .
3. For DC voltage, Resistance and DC current:

Multiply accuracy specification by 0.8% per degree C from 23C, i.e.  
 $\{1 + [\text{Absolute Value (Tcal} - 23) * .008]\}$

4. For AC voltage, and AC current:

Multiply accuracy specification by 1.3% per degree C from 23C, i.e.  
 $\{1 + [\text{Absolute Value (Tcal} - 23) * .013]\}$

Note 1: Tcal is the calibration temperature in degrees C.

Note 2: The operating temperature range for the E1412 remains unchanged at 0C to 55C, regardless of the calibration temperature. For example, if the E1412 is calibrated at 0C, then operation is still only specified for temperatures between 0C and 55C.

Example #1:

E1412 was calibrated at 30C.

A 7-volt DC measurement is being made at 32C on the 10-volt range using 90-day specs.

$$\begin{aligned}\text{Measurement accuracy} &= 7 \text{ +/- } [(7 * 0.00002) + (10 * 0.000005)] * \{1 + [\text{ABS}(30-23) * 0.008]\} \\ &= 7 \text{ +/- } (190\text{e-}6) * (1.056) \\ &= 7 \text{ +/- } 200.64\text{e-}6\end{aligned}$$

Example #2:

E1412 was calibrated at 0C.

A 9-volt DC measurement is being made at 12C on the 10-volt range using 90-day specs.

Tc is computed as the difference between the measurement temperature 12C and the calibration temperature 0C + 5C, i.e. 7C for this example.

$$\begin{aligned}\text{Measurement accuracy} &= \\ 9 \text{ +/- } &\{[(9 * 0.00002) + (10 * 0.000005)] + 7 * [(9 * 0.000005) + (10 * 0.000001)]\} * \{1 + [\text{ABS}(0-23) * 0.008]\} \\ &= 9 \text{ +/- } (615\text{e-}6) * (1.184) \\ &= 9 \text{ +/- } 728.16\text{e-}6\end{aligned}$$

### **3. E1412A EXPANDED HUMIDITY SPECIFICATIONS**

The following table defines the specification adders for operation in humidity's >65%RH and <=95%RH at +40C. The adders are stated as a % of Range per % of RH beyond 65% RH.

<i>Function</i>	<i>Range</i>	<i>Spec Adder</i>
DC VOLTAGE	.1	.00010
	1	.00005
	10	.00001
	100	.00005
	300	.00015
RESISTANCE	100	.00010
	1K	.00001
	10K	.00001
	100K	.00001
	1M	.00030
	10M	.00200
	100M	.02000
DC CURRENT	10mA	.00050
	100mA	.00025
	1A	.00002
	3A	.00100

#### **Circuit Changes:**

Ref. Designator	Description	P/N	Qty
U502	Programmed ROM	E1412-88822	1

The change in U502 converts the E1412-66501 to a E1412-66511.

## Instructions for converting an E1412A to an E1412A-J01

Parts needed: E1412-88822 (Programmed ROM)  
E1412-84310 (PCA label)  
E1412-84301 (Sheet metal S/N label)  
E1412-84311 (Sheet metal part number label)  
E1412-90601-1 (Modification data sheet)

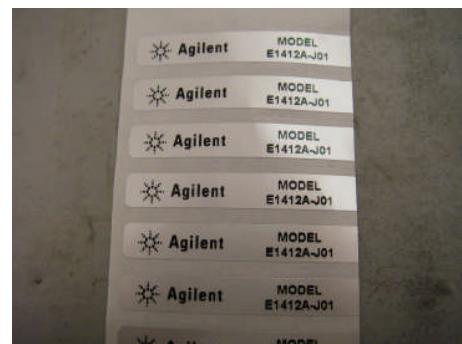
- 1) Remove U502 (P/N E1412-88812) from the PCA.

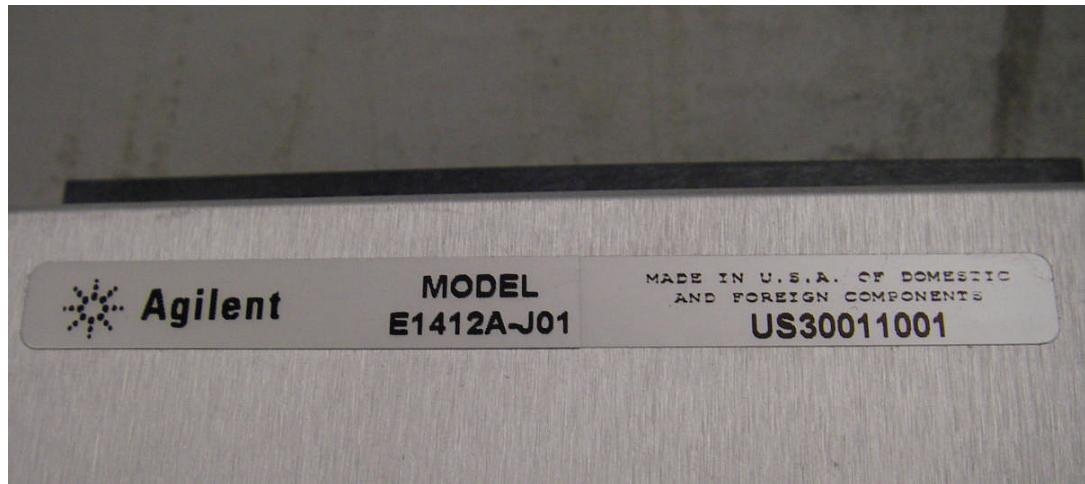


- 2) Place E1412-88822 on the U502 footprint and solder.
- 3) Place the E1412-84310 label over the silkscreened part number on the PCA.



- 4) Re-assemble the card and place the E1412-84301 over the existing serial number label on the side of the frame.





- 5) Place the E1412-84311 over the part number printed on the sheet metal.



- 6) Include an E1412A Instrument Modification data sheet with the device.

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